Ontario

Ministry of
Health and Long-Term Care

PHERO

Public Health and
Epidemiology Report Ontario

Volume 14, Number 10 www.health.gov.on.ca November 30, 2003

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The Public Health and Epidemiology Report Ontario is published monthly, by the:

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Ministry of Health and Long-Term Care
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ISSN 1181-960X

ENTERIC ILLNESS IN ONTARIO, CANADA, FROM 1997 TO 2001

ABSTRACT

Enteric illness is a common problem worldwide. In Ontario (population of 11.4 million, 2001 Census of Canada), laboratory-confirmed cases of "reportable" enteric diseases are reported to local health units. Public health staff members investigate these illnesses and subsequently report details to the Ministry of Health and Long-Term Care through an electronic reporting system. From 1997 to 2001, 44,451 sporadic cases of illness attributable to eight enteric pathogens (*Campylobacter, Salmonella,* verotoxin-producing *Escherichia coli, Yersinia, Shigella,* hepatitis A, *Listeria,* and *Clostridium botulinum*) were reported. This number was less than the 56,690 cases reported from 1992 to 1996. *Campylobacter* accounted for the highest annual average incidence rate at 42.3 cases per 100,000 persons, with *Salmonella* following at 22.6, verotoxin-producing *E. coli* at 3.7, *Yersinia* at 3.0, *Shigella* at 2.7, hepatitis A at 2.3, and *Listeria* at 0.3. The 4 months from June to September accounted for almost half (46.5%) of all cases. For 74.0% of the outbreaks associated with these eight enteric pathogens,

foodborne contamination was identified as the mode of transmission. Poultry and other meat items accounted for 68.4% of the food items when food was identified as the vehicle. Admittedly, the "foods" and "modes of transmission" identified may have been subject to investigator bias based on previous knowledge. The most common risk setting, which was reported in approximately half of the cases, was private homes; travel-associated illness and restaurants were the second and third most frequently reported risk settings at 24.6 and 14.1%, respectively. Findings from this study suggest that public health efforts should be directed toward safe food handling in the home during the summer months.

Enteric pathogens transmitted through food, water, or person-to-person contact are a major cause of illness worldwide. Disease surveillance systems can only assist in estimating the number of illnesses because of constraints in the reporting system hierarchy, from the individual affected to the case being entered in a database. In England, it is estimated that only one in six patients who have an infectious intestinal illness in any year present to their family doctor, and only one case is detected by a national surveillance system for every 136 cases that occur in the community *(17)*. Considering only those infections transmitted by food, the Centers for Disease Control and Prevention in Atlanta, Ga., estimates that 76 million cases of enteric illness occur annually in the United States *(12)*, affecting about one in four of the population. Although most of those who fall ill recover uneventfully, a small number of persons develop complications that can lead to lifelong debilitation. This paper provides an epidemiologic review of "reportable" bacterial and viral enteric disease data in Ontario for the 5 years from 1997 to 2001. The study was undertaken to identify disease characteristics that would assist in deter-mining strategies to decrease the occurrence of enteric illness.

MATERIALS AND METHODS

In Ontario, a "reportable disease" is defined in the *Health Protection and Promotion Act (6)*. Private and public health laboratories report laboratory-confirmed reportable diseases to 37 public health units. Public health staff members from the health unit contact the source of the case to collect information such as the onset of illness, symptoms, source of illness, and mode of transmission. Additional "epidemiologically linked" cases may be identified from the laboratory-confirmed case. Health units re-port laboratory-confirmed and epidemiologically linked cases, based on specific disease case definitions of reportable diseases, to the Ontario Ministry of Health and Long-Term Care on a weekly basis.

This study provides an analysis of sporadic cases of illness reported to the provincial database by episode date from January 1997 to December 2001 for eight enteric pathogens: *Campylobacter, Salmonella,* verotoxin-producing *Escherichia coli* (VTEC), *Shigella, Yersinia, Listeria,* hepatitis A, and *Clostridium botulinum*. The month and year of the occurrence of illness were determined from the onset date. When missing, the date of diagnosis or the episode date reported was used as a proxy. Travel (outside Canada) was analyzed as a risk setting, in general, but was further categorized according to the specific travel destination outside Ontario. The case was not identified as travel-associated if the onset of illness was more than 10 days after travel for *Campylobacter;* 7 days for *Salmonella, Shigella,* VTEC, and *Yersinia;* or more than 50 days for hepatitis A. Age-specific rates of illness were calculated by population data from *Statistics Canada* for 1997 to 2001 *(16)*.

Table 1

Number and percent of missing and unspecified values by category for enteric disease cases, Ontario, 1997 to 2001. (N=44,451)

Category	No. missing[a]	No. unspecified[b]	% missing and unspecified
Disease	0	0	0
Disease agent	919	1,780	6.1
Age	57	0	0.1
Gender	16	0	0.0
Mode of transmission	3,151	21,587	55.7
Symptoms[c]	49,768	790	56.9
Hospitalizations	33,317	336	75.7
Deaths	28,862	241	65.5
Risk setting	2,261	16,000	41.1
Food		11,503	78.9

[a] "Missing" means no entry made.

[b] "Unspecified" means implausible values, "unknown", or "other."

[c] Up to two symptoms allowed per case.

RESULTS

Between 1997 and 2001, there were 44,451 reported cases of the eight enteric diseases in Ontario. All were laboratory confirmed, except for 185 epidemiologically linked cases. The percentages of missing and unspecified values for each field are shown in Table 1.

During this 5-year period, the combined annual number of cases ranged from 7,643 in 1999 to 10,211 in 1998, with corresponding incidence rates of 66.3 to 89.7 illnesses per 100,000 persons (Fig. 1). *Campylobacter* accounted for the highest annual average incidence rate at 42.3 cases per 100,000 persons, with *Salmonella* following at 22.6, VTEC at 3.7, *Yersinia* at 3.0, *Shigella* at 2.7, hepatitis A at 2.3, and *Listeria* at 0.3. Table 2 shows the total number of cases by pathogen and species/serotypes.

Overall, the distribution of illness by gender was 51.7% males and 48.3% females (Fig. 2). Illness in males was higher for hepatitis A (63.0%), *Yersinia* (56.1%), and *Campylobacter* (53.1%). Illness in females was higher for VTEC (54.4%), *Listeria* (52.9%), *Shigella* (52.5%), and *Salmonella* (51.0%).

Overall, specific rates of illness by age-group were highest for persons between 0 and 4 years of age (Fig. 3). This age-group had the highest incidence rate for *Campylobacter, Salmonella, Yersinia,* VTEC, and *Shigella,* with 88.6, 84.0, 17.1, 14.4, and 6.2 illnesses per 100,000 persons, respectively. The incidence rate for *Campylobacter* decreased after the group of people between 0 and 4 years and then increased to 55.5 per 100,000 persons aged between 20 and 29 years. Incidence rates for VTEC began to increase slowly, after the group of people aged between 30 and 39 years, to 3.8 per 100,000 persons for those 70 years and older. The incidence rate for hepatitis A was highest for persons aged between 5 and 9 years at 3.5 per 100,000 and began to decline after the group of people aged between 30 and 39 years. The incidence rate for *Listeria* was greatest for persons 70 years and older at 0.61 per 100,000 of the general population.

Overall, cases occurred most frequently during July and August (Fig. 4). The 4 months from June to September accounted for 46.5% of all cases. During the same period, *Campylobacter, Salmonella,* and VTEC accounted for 42.6% of all cases.

Overall, loose diarrhea and watery diarrhea were the most frequently reported symptoms and combined for a total of 40.1% of all symptoms reported (Table 3). Together, these were the most frequently reported symptoms for illnesses attributable to *Campylobacter, Salmonella,* VTEC, *Yersinia,* and *Shigella.* Jaundice was the most frequently reported symptom for hepatitis A (19.8%), and fever was the most frequently reported symptom for *Listeria* (32.0%). The second most frequently reported symptom for VTEC was bloody diarrhea (27.0%).

One hundred thirteen deaths were reported during the 5-year period for an overall case-fatality rate of 0.25% (Table 4). The presence of a pathogen for 35 of the deaths, however, was reported as an incidental finding. The overall in-patient case-hospitalization rate was 3.8%. The in-patient case-hospitalization and case-fatality rates were highest for *Listeria* at 47.1 and 23.8%, respectively.

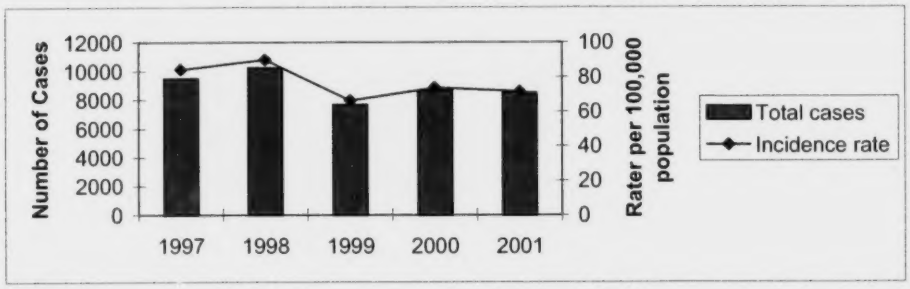
Overall, transmission of the pathogen by food was reported in 74.0% of the cases, with water following at 7.0%, person-to-person transmission at 6.0%, and animal contact at 5.8% (Table 5). Person-to-person transmission accounted for 23.8% of the cases of *Shigella* and for 31.7% of the cases of hepatitis A. In addition, 8.4% of the cases of hepatitis A were reported to have occurred from sexual contact.

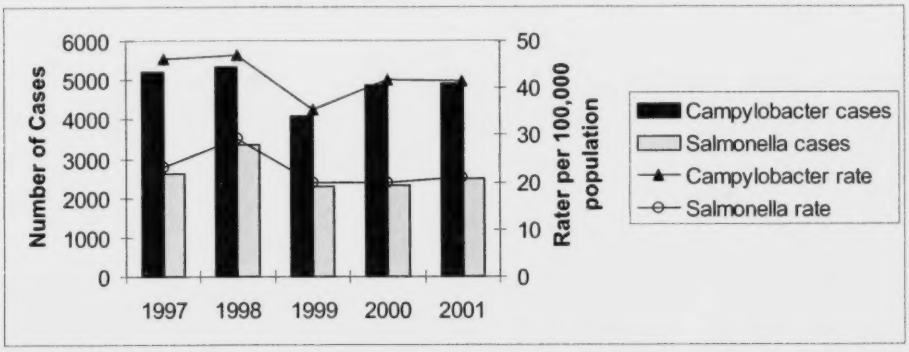
Although enteric pathogens were reported to have been transmitted by food in 14,580 cases, a specific food was named in only 3,077 cases (Table 6). For the pathogens listed, chicken was the most frequently reported food vehicle and was reported by 42.1% of the patients who reported eating a specific food. Beef was most frequently associated with cases in which illness was attributable to VTEC. Although a food vehicle was mentioned by only 66 patients with illnesses attributable to *Yersinia,* pork was mentioned 72.7% of the time.

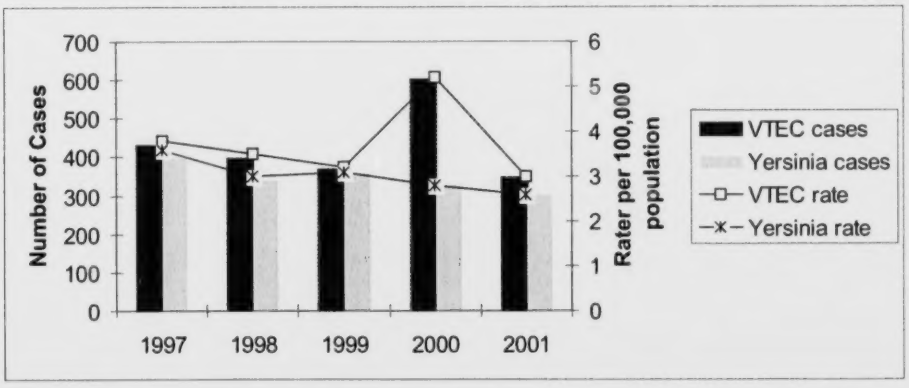
Overall, "home" was the most frequently reported risk setting and was reported by 50.2% of those who responded (Table 7). Home was also the most frequently cited risk setting for acquiring illnesses attributable to *Listeria, Yersinia,* VTEC, *Campylobacter,* and *Salmonella.* For the listed pathogens overall, "travel" (outside Canada) was the second most frequently reported risk setting at 24.6%, and it was the most frequently reported risk setting for acquiring illnesses attributable to *Shigella* and hepatitis A.

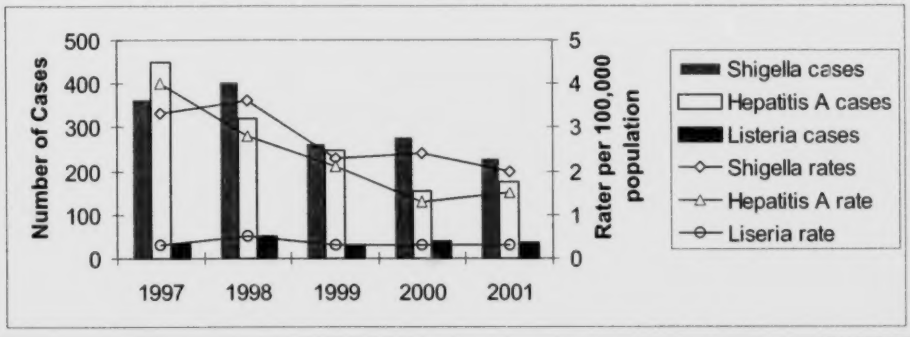
Figure 1

Enteric pathogens, by number and incidence rate by year, Ontario,1997 to 2001 (N=44,451)









Travel to the Caribbean accounted for 23.4% of the illnesses attributable to the listed pathogens when the setting was travel outside Ontario (Table 8). Patients with illness attributable to *Salmonella* reported travel to the Caribbean more frequently (40.9%) than travel to other destinations. Cuba accounted for 15.7% and the Dominican Republic for 17.2% of all *Salmonella* illnesses from patients who specified destinations outside Ontario. Patients with illnesses attributable to hepatitis A and *Campylobacter* reported travel to Asia more frequently than to other regions—33.1 and 20.1%, respectively.

DISCUSSION

Imperfect reporting is a characteristic of all reporting systems that are similar in size to the system that provided the data for this report *(12, 17)*. The 44,451 cases reported from 1997 to 2001 in Ontario under represent the true number of enteric illnesses; however, the magnitude of under-reporting cannot be determined. The high cost of completely and properly capturing data in these types of reporting systems is likely prohibitive and must be balanced against capturing data well enough to detect trends and other in-formation that will be useful in determining appropriate health care decisions. A number of variables in the database were left with more than 50% of the fields having missing or unspecified data. It is recognized that the available data are not necessarily a representative sample of the total population. If more data were available, it is possible that the analysis and interpretation of results would be different. The following discussion pertains to findings that were re-ported and does not take into account the missing or unspecified data.

The trend in the annual number of cases appeared to decrease during the 5-year period under study. The number of cases from 1997 to 2001 (44,451) was less than the number of cases reported from 1992 to 1996 (56,690) *(14)*. *Campylobacter* was the leading cause of illness in Ontario in both of the 5-year periods, with the period from 1997 to 2001 representing about 55% of the total of the eight enteric pathogens under study (Fig. 1). Therefore, total numbers are influenced to a large extent by this single pathogen. The second leading cause of illness was *Salmonella,* which was responsible for almost 30% of all cases. VTEC, *Yesinia, Shigella,* and hepatitis A collectively added to approximately 15% of the total number of enteric illness cases. *Listeria* represented less than 1% of all cases.

Table 2

Enteric pathogens, by number of cases, and by serotype[a] for *Campylobacter*, *Salmonella*, and *Shigella*, Ontario, 1997 to 2001 (N=44,451).

Species/Serotype	Isolates	%
Campylobacter		
jejuni	22,195	90.9
coli	397	1.6
laridis	13	0.05
fetus	12	0.05
Missing/unspecified	1,795	7.4
Total	24,412	100.0
Salmonella - top 10		
Typhimurium	2,434	18.6
Enteritidis	2,392	18.3
Heidelberg	1,424	10.9
Hadar	608	4.7
Thompson	486	3.7
Agona	296	2.3
Infantis	217	1.7
Newport	215	1.6
Brandenberg	129	1.0
Braenderup	121	0.9
Other serotypes/ missing/unspecified	4,737	36.3
Total	13,059	100.0
VTEC		
Total	2,155	100.0
Yersinia		
Total	1,742	100.0
Shigella		
sonnei	957	61.7
flexneri	426	27.5
boydii	72	4.6
dysenteriae	46	3.0
Missing/unspecified	49	3.2
Total	1,550	100.0
Hepatitis A		
Total	1,342	100.0
Listeria		
Total	189	100.0
Clostridium botulinum		
Total	2	100.0
Grand Total	44,451	100.0

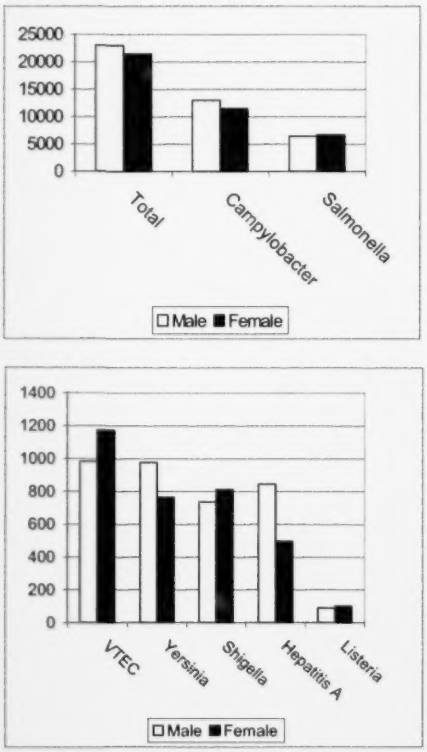
[a] Laboratory specimens could not always be typed.

Although the incidence rates for *Campylobacter* and *Salmonella* appeared to decline from 1997 to 1999, they increased slightly for 2000 and 2001 (Fig. 1). An increased incidence of *Salmonella* in 1998 was because of an outbreak of *Salmonella* Enteritidis affecting nearly 700 persons nationally *(15)*. Two hundred fifty-two cases were reported in Ontario. Incidence rates of illness appeared to drop for VTEC during the 5 years, except in 2000, when there was a large waterborne outbreak that reportedly affected more than 2,300 persons in a population-based study *(13)*. One

hundred seventy-eight cases were reported in this Ontario database. Incidence rates for *Yersinia, Shigella,* and hepatitis A also declined during this period. The incidence rate for *Listeria* was consistently less than 0.5 cases per 100,000. Although the incidence of these enteric diseases appears to be declining, the potential remains for occurrences of large outbreaks resulting from a pathogen having contaminated a widely distributed food product or a large water distribution system.

Figure 2

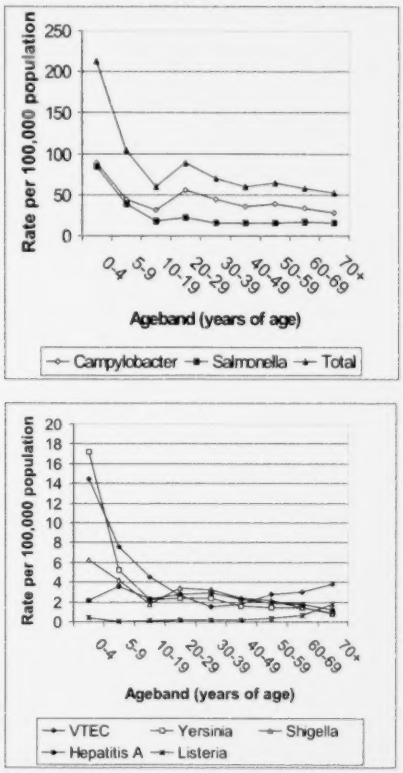
The number of enteric illness cases by gender, Ontario, 1997 to 2001. Total represents all cases from the seven enteric pathogens.



In the present study, the incidence rate for *Campylobacter* averaged 42.6 cases per 100,000 persons, and for *Salmonella,* the incidence rate was more than 22.6 cases per 100,000 persons (Figure 1), both of which are much higher than the incidence rates for these pathogens in the United States, which were 19.6 and 13.3, respectively *(5),* during the same 5 years. Many factors could contribute to these differences, including geography, climate, access to heath care, public health interventions, and data-reporting methodologies.

Figure 3

The number of enteric illness cases by specific incidence rates by age-group, Ontario, 1997 to 2001. Total represents all cases from the seven enteric pathogens.



The 4 months from June to September accounted for almost half (46.5%) of all cases, when 33% would be expected had there been no seasonal distribution. A large percentage of this increase was due to *Campylobacter, Salmonella,* and VTEC, which collectively accounted for 42.6% of all cases during this period. These three pathogens are characterized by high rates of disease transmission through food consumption. The increased incidence of illness in the summer months likely occurs be-cause of the warmer environmental temperatures, which encourage greater pathogen growth in "poorly handled" food items or perhaps increased colonization in source animals.

The most commonly reported symptom was loose or watery diarrhea, which is consistent with other outbreak reports that provide symptomatologic profiles *(1–4, 7).* Bloody stools were reported in 27.0% of the VTEC cases but were reported in less than 10% of the

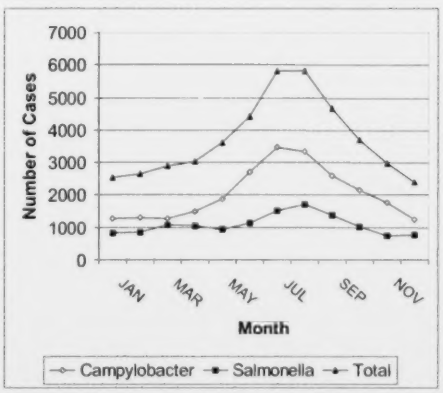
Table 3

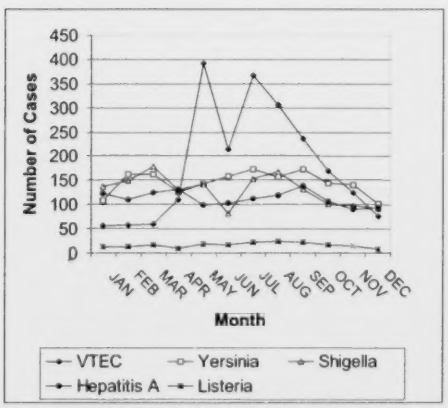
Enteric pathogens, by frequency distribution of reported symptoms associated, Ontario, 1997 to 2001. (N=38,340, up to two symptoms were allowed per case)

Sympton	% Campylobacter	% Salmonella	% VTEC	% Yersinia	% Shigella	% Hep. A	% Listeria	% Total	Total
Watery Diarrhea	23.6	22.5	16.1	24.4	25.7	1.6	4.1	21.9	8,393
Loose Diarrhea	19.4	19.5	11.9	20.0	17.2	4.5	5.7	18.2	6,987
Abdominal Pain	13.0	10.8	12.9	15.1	8.3	12.9	2.6	12.2	4,673
Fever	11.6	13.1	4.6	12.2	14.1	16.6	32.0	12.0	4,618
Cramping	9.2	7.9	9.6	9.1	7.6	0.4	2.1	8.4	3,212
Nausea/Vomiting	6.2	8.3	6.9	4.7	8.4	14.1	7.2	7.3	2,780
Bloody diarrhea	6.7	5.7	27.0	3.5	8.9	0.1	1.5	7.2	2,776
Headache	1.0	1.1	0.2	0.5	1.4	1.8	4.1	1.0	388
Jaundice	0	0	0	0	0.1	19.8	0.5	0.9	331
Fatigue	0.3	0.3	0.2	0.2	0.1	5.6	1.0	0.5	209
Other	9	10.8	10.6	10.3	8.2	22.6	39.2	10.4	3,973
Total									38,340

Figure 4

The number of enteric illness cases by month, Ontario, 1997 to 2001. Total represents all cases from the seven enteric pathogens.





Shigella, Campylobacter, Salmonella, and *Yersinia* cases and rarely in hepatitis A or *Listeria* cases. Jaundice and fatigue were commonly reported for hepatitis A but not for the bacterial pathogens. Symptomatology profiles may be useful in identifying an etiologic agent before laboratory results are known.

Of the 113 deaths that were reported, the presence of a pathogen was reported to be an incidental finding in 35 (Table 4). The case-fatality rates observed in this study were generally similar to those observed in the United States from 1996 to 1998 *(10): Campylobacter,* 0.06 Ontario versus 0.06% United States; *Salmonella,* 0.27 versus 0.56%; VTEC, 0.56 versus 0.65%; and *Listeria,* 23.8 versus 15.5%. Of the 12 deaths reported in Ontario from VTEC, seven of them were from a large waterborne outbreak in 2000 *(13).* Fatalities and hospitalizations represent a substantial burden to society in direct and indirect costs, much of which could be avoided, as enteric illness is considered preventable.

The mode of transmission was reported in 44.3% of all cases (Table 5). This percentage improved from the period 1990 to 1994, when a mode of transmission was re-ported in only 31.5% of the cases *(9).* Enteric diseases are often referred to as foodborne diseases, and this reference is somewhat supported by foodborne transmission having been the mode of transmission in 74.0% of the cases for the eight enteric pathogens for which modes were reported. Other identified modes of

Table 4

Enteric pathogens, by hospitalizations and deaths, Ontario, 1997 to 2001.

	Campylobacter	*Salmonella*	VTEC	*Yersinia*	*Shigella*	Hepatitis A	*Listeria*	*Clostridium botulinum*	Total
Hospitalizations									
In patient	469	619	318	23	36	123	89	1	1678
Out patient	421	239	84	14	32	17	3	0	810
In-patient case hospitalization rate	1.9%	4.7%	14.8%	1.3%	2.3%	9.2%	47.1%	50.0%	3.8%
Deaths									
Underlying cause of death	0	1	6	0	0	0	6	0	13
.....Contributed to death, but not underlying cause	3	5	0	0	0	2	15	0	25
Did not contribute to death, incidental finding	5	16	3	0	0	0	11	0	35
Missing/unspecified data on relationship to death	7	13	3	0	1	3	13	0	40
Total	15	35	12	0	1	5	45	0	113
Case Fatality Rate (total deaths/total number of cases)	0.06%	0.27%	0.56%	0	0.07%	0.37%	23.8%	0	0.25%

Table 5

Enteric pathogens, by mode of transmission, Ontario, 1997 to 2001.

Mode of transmission	% *Campylobacter*	% *Salmonella*	% VTEC	% *Yersinia*	% *Shigella*	% Hepatitis A	% Listeria	% Total	Total
	%	%	%		%	%	%		
Food	75.9	80.1	59.9	75.0	47.1	36.1	31.6	74.0	14,580
Water	6.6	3.2	21.5	5.5	19.9	12.9	2.6	7.0	1,382
Person-to-person	3.0	6.3	8.8	6.7	23.8	31.7	10.5	6.0	1,186
Animal contact	7.6	4.3	5.9	0	0	0	0	5.8	1,133
Sexual	0	0	0	0	0	8.4	0	0.2	46
Other	7.0	6.1	4.0	12.8	9.1	10.9	55.3	7.0	1,386
Total								100.0	19,713

transmission included water at 7.0%, person-to-person transmission at 6.0%, and animal contact at 5.8%.

Poultry and other meat items accounted for 68.4% of the identified food items associated with illness (Table 6). Caution should be exercised when interpreting both the food items and mode of transmission associated with the foodborne illnesses because the public health investigator may have subjectively identified the

Table 6

Enteric pathogens, by most frequently identified food items associated with foodborne illness, Ontario, 1997 to 2001.

Food	% *Campylogacter*	% *Salmonella*	% VTEC	% *Yersinia*	% *Shigella*	% Hepatitis A	% Listeria	% Total	Total
Chicken	54.9	37.3	10.9	7.6	8.8	0	0	42.1	1,295
Beef	9.9	8.0	52.2	4.5	2.9	0	0	11.4	352
Cheese	0.7	22.0	1.0	0	0.0	0	87.5	9.3	285
Pork	3.9	4.5	12.9	72.7	64.7	0	0	6.8	209
Meat	7.8	2.5	8.46	7.6	11.8	0	0	5.6	172
Eggs	1.6	10.5	0	1.5	0	0	0	4.9	152
Other poultry	5.7	4.5	1.0	0	0	0	0	4.5	140
Raw milk	6.9	1.6	3.48	4.5	0	0	0	4.3	131
Shellfish	0.1	0.3	1.0	0	5.9	97.4	0	2.8	85
Fish	1.7	2.1	1.99	1.5	2.9	0	0	1.8	56
Cider	0	0.1	4.48	0	0	0	0	0.3	10
Other	6.7	6.7	2.49	0	2.9	2.6	12.5	6.2	190
Total									3,077

item. Although the food item or mode of transmission was reported, it may not have been confirmed or proven to be the cause.

Private homes were the most common risk setting and were reported by 50.2% of the patients who reported a risk setting (Table 7). Travel-associated illness and restaurants were the second and third most frequently reported risk settings at 24.6 and 14.1%, respectively. Public health interventions target restaurant settings to a great extent because there is a public expectation that restaurants will provide wholesome food. Given that reports of enteric disease acquired in the home are likely to be relatively underreported when compared to reports of enteric disease acquired in restaurants, there is an opportunity to improve enteric disease prevention in the home. Good food handling practices should be considered a life skill and taught in school.

Approximately 25% of all enteric diseases reported in Ontario were identified as having been acquired outside Ontario. MacDougall and Gyorkos *(11)* have recommended that healthier travel be better promoted by the pre-departure use of travel health clinic services. Simple strategies such as hand washing before eating, eating foods hot, and consuming only water that has been treated are considered effective if followed *(8)*. Although efforts can be made to warn travelers of the risks of acquiring an enteric disease while traveling, a pathogen may be acquired inadvertently, even when the traveler takes precautionary measures. Upon return to Ontario, these cases impart a financial burden to the

Table 7

Enteric pathogens, by risk settings associated, Ontario, 1997 to 2001.

Risk Settings	Campylobacter %	Salmonella %	VTEC %	Yersinia %	Shigella %	Hep. A %	Listeria %	Total %	Total
Home	51.0	50.4	66.4	67.3	19.2	27.8	70.7	50.2	12,686
Travel	21.8	25.4	7.6	13.0	68.5	49.3	4.3	24.6	6,225
Restaurant	16.0	14.0	12.6	8.1	3.6	6.2	2.2	14.1	3,553
Workplace	5.5	3.8	2.6	3.1	2.5	1.5	0	4.5	1,134
Institute	2.2	4.5	5.3	5.6	2.3	5.5	22.8	3.4	855
Other	3.4	1.8	5.5	2.8	3.8	9.9	0	3.2	819
Total									25,272

Table 8

Enteric pathogens, by travel outside Ontario, reported in Ontario, 1997 to 2001.

Region	Campylobacter %	Salmonella %	VTEC %	Yersinia %	Shigella %	Hep A %	Listeria %	Total %	Total
North America									
Canada - out of Ontario	2.7	1.6	4.3	4.2	0.3	3.4	66.7	2.3	68
United States	6.3	5.5	8.7	14.6	1.4	12.7	0	6.5	192
Mexico	10.5	13.7	21.7	10.4	15.0	14.6	0	12.6	373
Caribbean	14.3	40.9	21.7	25.0	30.2	6.6	0	23.4	393
Central America	3.5	2.4	0	2.1	6.8	5.6	0	3.8	112
South America	8.0	3.6	4.3	2.1	12.1	5.3	0	6.7	19.9
Europe	17.8	12.0	21.7	16.7	2.3	5.0	0	12.6	373
Middle East	4.0	2.1	8.7	2.1	3.7	6.6	0	3.7	111
Africa	5.5	2.3	0	6.3	7.3	2.9	0	4.4	130
Asia	20.1	9.8	4.3	16.7	17.2	33.1	33.3	18.2	540
South East Asia	7.0	6.0	4.3	0	3.7	3.7	0	5.7	170
Other	0.2	0.1	0	0	0	0.5	0	0.2	6
Total									2,967

health care system, both directly and indirectly. In the authors' opinion, however, the risk of these returning individuals transmitting the pathogen to others is low, and thus, the burden of illness attributable to persons acquiring their illness from a returning traveler is relatively small compared to other modes of transmission.

CONCLUSION

The data from this report are subject to many of the reporting constraints inherent in large reporting systems of this type; however, some important points can be identified by analyzing these data. From 1997 to 2001, almost 9,000 cases of enteric disease were reported annually in Ontario. For the eight enteric diseases considered, there appears to be a downward trend during this 5-year period, and the number of reported illnesses for the period under study was less than that from 1992 to 1996.

Travel outside Canada accounted for approximately 25% of the eight enteric pathogens considered. This represents a significant burden of illness to the health system in Ontario from pathogens that are not acquired in Ontario.

If foodborne transmission truly represents three fourths of the eight enteric pathogens considered in this paper, if more than 40% of foodborne illnesses occur during the summer months, and, finally, if the home represents the risk setting for approximately 50% of enteric diseases, then efforts should continue to be directed toward safe food handling in the home setting during the summer months. For example, partnerships with schools, senior citizen centers, and travel clinics could be strengthened to deliver important food safety messages.

ACKNOWLEDGMENTS

The authors thank the staff at Ontario's 37 health units as well as the staff at laboratories in Ontario for the work performed in reporting the enteric illness data from which this paper was written.

❑

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INFLUENZA IMMUNIZATION COVERAGE IN LONG-TERM CARE FACILITIES AND HOSPITALS IN ONTARIO, BETWEEN 1999/00 AND 2002/03 INFLUENZA SEASONS

Introduction

Annual vaccination in autumn of people at high-risk and of people capable of transmitting influenza to those at high-risk are the most important measures for reducing the impact of influenza. The Ontario Ministry of Health and Long-Term Care has provided influenza vaccine at no charge through its public health program since 1988 to those at high-risk of influenza-related complications. In 1993, the program was expanded to cover patient-care staff of long-term care facilities. In the 1999/2000 season the program was further expanded to include all staff in homes for the aged, nursing homes, retirement homes, and chronic care facilities/units who may have the potential for acquiring or transmitting influenza during the course of their work. Later in that year, i.e., 2000/2001 season, the Universal Influenza Immunization Program (UIIP) was implemented to provide influenza vaccine at no charge to high-risk groups as well as the general public.

On November 1st, 1999, the Ministry of Health and Long-Term Care issued an Influenza Surveillance and Prevention Protocol to Ontario nursing homes and homes for the aged[1]. As well, in July 2000, the minister approved an Influenza Surveillance Protocol for public hospitals, developed jointly by the Ontario Medical Association, Ontario Hospital Association, and Ministry of Health and Long-Term Care[2]. The main requirement of the protocols is that each facility has a policy to address influenza surveillance, prevention (including annual immunization), and outbreak control. Under both protocols, influenza vaccine coverage rates from Long-Term Care Facilities (LTCFs) and public hospitals are to be reported to the local medical officer of health by December 1st of each year.

The Ministry of Health and Long-Term Care has a goal to increase vaccination rates of health care workers, which ultimately protects the health of those under their care, especially the elderly, in institutions. The objective is to collect and analyse influenza immunization coverage data from LTCFs and Hospitals as of December 1, annually, to evaluate the effectiveness of the program at the provincial level.

Methods

Forms to facilitate standardized data collection were mailed to all 37 health units at the beginning of each influenza season. Data collected included: The type of LTCF reporting (i.e. Home for the Aged or Nursing Home), Total number of staff and residents in the facility, and the numbers of staff and residents vaccinated for influenza by November 15 (as per the recommendation of the National Advisory Committee on Immunization). Starting in the 1999/2000 season for LTCFs and in the 2000/01 influenza season for hospitals, results for each facility were reported by the local health unit to the ministry electronically using a web-based information system developed for this purpose. Each health units was assigned a user ID and password to ensure confidentiality.

For each influenza season, data is analyzed from all LTCFs in Ontario who report influenza immunization rates. The total number of facilities varies yearly and depends on status of LTCFs, i.e., amalgamations and newly established or closure of existing facilities. As of January 6, 2003, there were 543 LTCFs in Ontario. Data is collated and analyzed from 462 (2000/01), 434 (2001/02), and 487 (2002/03) facilities in each of the respective influenza seasons by the Public Health Branch, Ministry of Health and Long-Term Care. Duplicate or incomplete records were omitted from the analysis. During the 2000/01, 2001/02, and 2002/03 influenza seasons the following types of LTCFs reported influenza immunization rates: Homes for the Aged (range 31-34% of all reporting facilities), Nursing Homes (range 64-68% of all reporting facilities), and long-term care wards of hospitals (range 1-2%).

Results

Influenza Immunization Coverage in LTCFs: Staff

For the 2002/03 influenza season, staff immunization coverage rates were reported for 487 LTCFs. The median staff coverage for the 2002/03 influenza season was 82.4%. 353 LTCFs (72.5%) had staff immunization rates greater than the Mandatory Health Programs and Services Guidelines target of 70% coverage. 125 LTCFs (25.7%) reported staff coverage rates of greater than 90%.

For the 2001/02 influenza season[3], staff immunization coverage rates were reported for 432 LTCFs. The median staff coverage for the 2001/02 influenza season was 86.4%. 334 LTCFs (77.3%) had staff immunization rates greater than the Mandatory Health Programs and Services Guidelines target of 70% coverage. 202 LTCFs (46.8%) reported staff coverage rates of greater than 90%.

For the 2000/01 influenza season[4], staff immunization coverage rates were reported for 452 LTCFs. The median staff coverage for the 2000/01 influenza season was 90.1%. 394 LTCFs (87.2%) had staff immunization rates greater than the Mandatory Health Programs and Services Guidelines target of 70% coverage. 228 LTCFs (50.4%) reported staff coverage rates of greater than 90%.

For the 1999/00 influenza season[5], the median staff coverage was 86.3%. For the 1999/00 season, 88.5% of staff had coverage rates greater than 70% and a marked increase in coverage from previous years.

LTCF staff vaccination coverage prior to 1999/00[6,7] was about 40% with wide range (1-83%) across homes and regions. During the 1999/00 influenza season, only 38% of facilities had coverage rates greater than 90%.

Residents

For the 2002/03 influenza season, resident immunization coverage rates were reported for 487 LTCFs. The median resident coverage for the 2002/03 influenza season was 95.0%. 253 LTCFs (52.0%) had resident coverage rates greater than the Mandatory Health Programs and Services Guidelines target of 95% coverage.

For the 2001/02 influenza season[3], resident immunization coverage rates were reported for 434 LTCFs. The median resident coverage for the 2001/02 influenza season was 95.5%. 250 LTCFs (57.6%) had resident coverage rates greater than the Mandatory Health Programs and Services Guidelines target of 95% coverage.

For the 2000/01 influenza season[4], resident immunization coverage was reported for 462 LTCFs. The median resident coverage for the 2000/01 influenza season was 95.2% (92.9% in 1999/00). 250 (54.1%) LTCFs had resident coverage rates grater than the Mandatory Health Programs and Services Guidelines target of 95% coverage.

LTCF resident vaccination coverage prior to 1999/00 was about 89% with wide range (1-100%) across homes and regions.

Influenza Immunization Coverage in Hospitals

For the 2002/03 influenza season, data was analyzed from 190 hospital sites (out of a total of 231 sites of 154 corporations) operating under the Public Hospitals Act in Ontario. The overall staff median coverage rate for the 2002/03 season influenza was 43.96%

Median staff coverage rate for 2001/02 influenza season was 50.8% compared to 63.3% in 2000/01. Since the

Table 1

LTCF Influenza Immunization Coverage (%)*

	1999/00	2000/01	2001/02	2002/03
Staff**	86.3	90.1	86.4	82.4
Residents***	92.9	95.2	95.5	95.0

* Median Coverage Rate

** Prior to 99/00 approx. 40% (1-83%)

*** Prior to 99/00 approx. 89% (1-100%)

2000/01 influenza season was the first year where hospitals were required to report staff immunization coverage rates, with initial poor reporting to Medical Officers of Health, reports were accepted until the end of January resulting in the inclusion of staff immunization from December and January. This likely contributed to the higher rate of staff immunization coverage for the 2000/01 reporting.

There is no surveillance data for staff influenza vaccination coverage prior to 1999/00; but it is estimated, based on local studies, that the median coverage was about 20% in Ontario hospitals.

Table 2

Hospital Staff Influenza Immunization Coverage (%) *

	2000/01	2001/02	2002/03
Staff	63.3	50.8	43.96

* Median Coverage Rate

Discussion

Influenza is an acute viral disease of the respiratory tract characterized by fever, headache, myalgia, prostration, sore throat and cough. Influenza derives its importance from the rapidity with which epidemics evolve, widespread morbidity, and the seriousness of complications, notably viral and bacterial pneumonias. During epidemics, severe illness and deaths occur, primarily among the elderly and those with underlying diseases. Clinical attack rates during epidemics range from 10% to 20% in the general community to >50% in closed populations such as nursing homes[8].

Influenza vaccine is effective in preventing infection by influenza A and B in health care workers and may reduce reported days of absence and febrile respiratory illness. Data from studies indicates that vaccination of health care workers can decrease transmission of influenza and influenza related complications. Data from studies suggest that a policy of annual influenza vaccination of health care staff will reduce influenza infections and can reduce associated illness.[9]

The main strategy of promoting the use of influenza vaccine among health care workers is through health promotion and education. Despite the successes of these methods in some settings, the desired level of immunization has not been achieved prior to 1999.

Although overall vaccination rates were high among residents of institutions affected by outbreaks in Ontario (mean 92% in the 1997/98 and 85% in the 1998/99 season), the vaccination coverage of staff lagged behind (mean 35% in 1997/98 season and 39% in the 1998/99 season). A high vaccination rate of staff is desirable to prevent outbreaks in institutions. In order to reach the targeted level of coverage of above 70%, several working groups of the Ministry of Health, Medical Officers of Health and various professional associations explored policy solutions. This resulted in the issuance of the Influenza Surveillance in LTCFs in 1999 and the Influenza Surveillance Protocols for hospitals in 2000.

Vaccination policies, based on provincial authoritative recommendations, are effective in increasing staff influenza immunization coverage in LTCFs.

Acknowledgements

The authors would like to acknowledge the assistance of the following: Marty Sargent of the Corporate Liaison & Resource Service and all public health units for their participation in the provincial institutional influenza coverage database.

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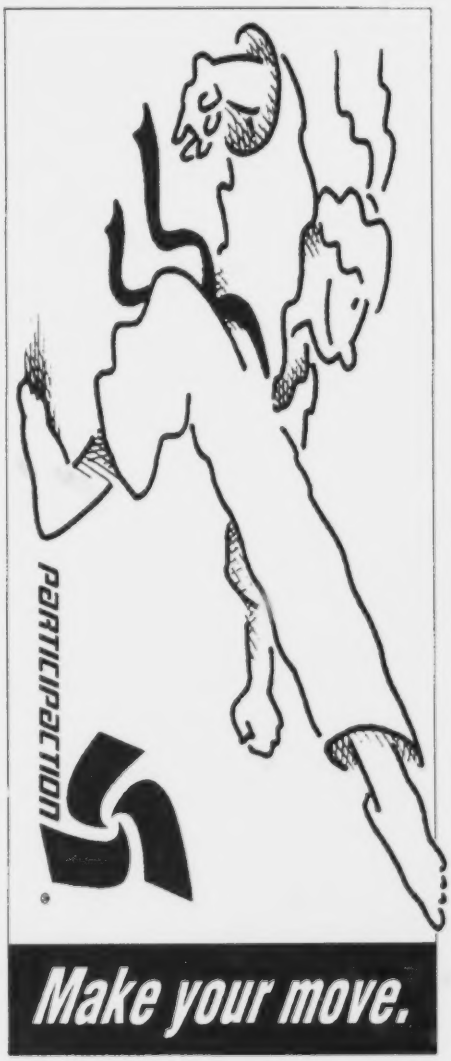


Communiqué
Public Health Research, Education and Development Program

EVALUATION OF THE OTTAWA SMOKE-FREE YOUTH PROJECT *EXPOSÉ*

PHASE ONE: IMPLEMENTATION OF THE SCHOOL SMOKING PROFILE IN TWENTY-SEVEN OTTAWA HIGH SCHOOLS

BACKGROUND

In September 2002, City of Ottawa Public Health introduced a new campaign related to tobacco and youth. This Smoke-Free Youth Project called, *exposé,* includes a media contest and campaign, cessation for youth, promotion and enforcement of Ontario's *Tobacco Control Act*, curriculum support, youth mobilization and school and community development.

This comprehensive program is intended to:

- prevent initiation of smoking and tobacco addiction;
- encourage young people to quit smoking;
- reduce youth access to tobacco;
- deliver hard-hitting anti-tobacco messages;
- change community norms by diminishing tobacco's attractiveness;
- share information about addiction and the risks associated with exposure to second-hand smoke.

Twenty Ottawa high schools participated in the program during the 2002-2003 school year and an additional twenty high schools (total of 40) have been included in this year's initiative. By the 2004-2005 school year, we anticipate that all Ottawa high schools will have participated and approximately 50,000 students will have been reached.

EVALUATION

A major component of the evaluation for this project is the use of the School Smoking Profile (SSP). The SSP was developed by the faculty and staff with the Centre for Behavioural Research and Program Evaluation and the Health Behaviour Research Group at the University of Waterloo. The SSP consists of a questionnaire, designed to collect data from every student in a school; a quality controlled computer scanning procedure for the questionnaires; and software that generates a "School Smoking Profile" feedback report for the school and the Boards.

Conducting the survey, analyzing the results and disseminating the information requires an active partnership between City of Ottawa Public Health; the University of Waterloo, Health Behavior Research Group; and the four Ottawa School Boards.

Data collection is an intense collaborative effort between Ottawa Public Health staff, the four School Board research officers and individual school administration and staff. A detailed and well-monitored protocol ensures consistency in the collection of the data. University of Waterloo staff are responsible for producing the questionnaire, data management, analysis and compiling the school and board level School Smoking Profile reports. All project protocols are vetted through the Office of Research Ethics at the University of Waterloo, the Research Ethics Board at Ottawa Public Health and through each School Board's ethics review process.

In the spring of 2003, we surveyed students in 27 high schools, grades 9 to OAC, in order to provide baseline measurements of key indicators related to tobacco use. Selected results from the SSP for all Ottawa high schools surveyed are reported in the following section using excerpts from the actual report.[1]

The Smoke-Free Youth project will use the SSP report to track important indicators over time and as an intervention strategy.

RESULTS

Smoking Prevalence

A total of 17,601 students completed the survey representing a response rate of 80.28%.

Overall 21% of the students surveyed in the City of Ottawa reported that they currently smoke. Figure 1 summarizes

the percentage of students who smoke by grade and by gender. An occasional smoker is defined as a person who currently smokes cigarettes, but not every day. A daily smoker currently smokes cigarettes every day.

Students' Perceptions of Peer Smoking Rates

We asked students, *"How many people your age do you think smoke cigarettes?"* The results reported in table 1, show that the majority (72%) of students in the schools surveyed believe that smoking is more common than it is.

Figure 1:

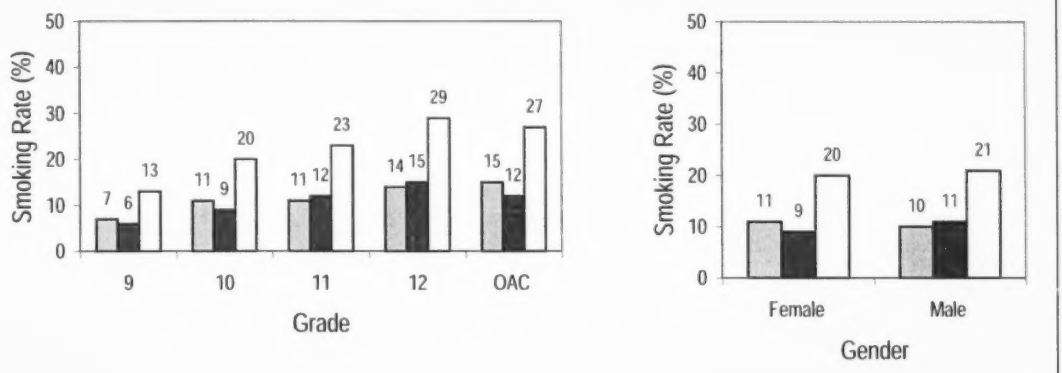


Table 1: Students' Perceptions of Peer Smoking Rates

Response Options (%)	Percentage of Students Responding		
	Non-Smokers	Smokers	All
91-100	2	6	3
81-90	3	6	4
71-80	8	12	8
61-70	10	13	11
51-60	11	11	11
41-50	15	16	16
31-40	20	16	19
21-30	16	12	15
11-20	10	6	9
0-10	5	2	4

72% of respondents overestimated*

13% of respondents underestimated*

* relative to the City of Ottawa's estimated smoking rate of 21%

Reported Reasons for Smoking

We asked students who consider themselves smokers, to select all that apply from a list of reasons for smoking. Their responses demonstrate the wide range of motivations for smoking among students in the City of Ottawa. The two most popular reasons for smoking were related to relieving stress and special events.

Exposure to Smoking among Friends and Family (in a text box)

All students were asked, "*How many of your 5 closest friends smoke cigarettes?*" Compared to non-smokers, smokers are more likely to report that they have friends

who smoke. In fact, 66% of non-smokers report that none of their 5 closest friends smoke cigarettes, and 42% of daily smokers report that ALL five of their closest friends smoke. Students were also asked if their father, mother, or older siblings smoke. Again there is a noticeable difference in the experiences of smokers and non-smokers. Smokers were far more likely to have an immediate family member who smokes. At least one person smoked inside the home of 46% of smokers compared to only 25% of non-smokers.

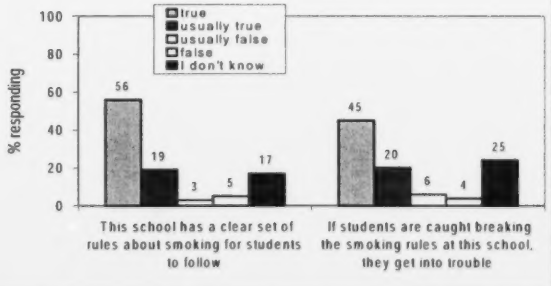
Reasons for Staying Smoke-Free

When asked to identify the reasons they choose **not** to smoke, "health concerns" (74% females, 66% males) and "no interest in smoking" (72% females, 61% males) were the two most popular reasons cited by non-smokers. "Waste of money", "enjoy doing other things" and "have seen the effects on others" were selected by more than 50% of respondents.

Where, When and With Whom Students Smoke

We asked students who consider themselves smokers, where, when, and with whom they smoke. Their responses provide a more complete picture of smoking in the City of Ottawa and will inform decisions on program planning. Most students who smoke reported that they often smoke with friends and seldom smoke with parents or other family. Thirty-two per cent of students who smoke reported that they often smoke alone, an indication of addiction. Students also reported that they often smoke at places like parties and concerts rather than at home.

Figure 2: Awareness of Smoking Policies



Awareness of Smoking Policies

Many students smoke while "at school." However, most leave school property to do so. Still, 43% of smokers reported that they often or sometimes smoke on school property. Additionally, 93% of all students said that the statement, "*I often see students smoking near this school*" is "true" or "usually true." When the students were asked, "*How many students at this school smoke where they are not allowed to?*" 63% of them responded 'a lot' or 'some.' Most students reported that the school has a clear set of rules about smoking, and that students caught breaking the rules face consequences (see figure 2).

How students obtain cigarettes

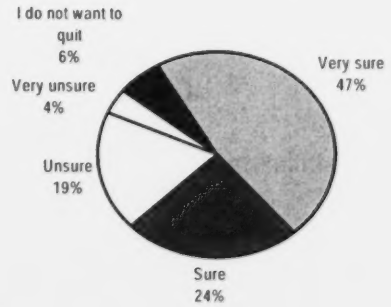
Most of the students surveyed were under the age of 19. Although provincial legislation prohibits the sale of cigarettes to anyone under the age of 19, many students were able to obtain cigarettes. In many cases they were not asked their age. In the past month, 44% of smokers stated that they were not asked their age when buying cigarettes, another 21% were asked less than half the time. Only 16% were always or almost always asked their age when buying cigarettes. The majority of students purchased their cigarettes (41%). However, a significant number obtained cigarettes from friends (35%). Very few reported obtaining cigarettes from home (4%).

Quitting Smoking

Students can have a very difficult time quitting even when they are strongly motivated to do so.

When daily smokers were asked, "*How many times in the past year have you tried to quit smoking?*" the majority (57%) reported one or more quit attempts. When students were asked about their plans to quit smoking, the majority of students (66% of females and 54% of males) planned to quit, but were not sure when. Another 23% of females and 28% of males planned to quit within a week to a year. Of those who smoked, 11% percent of females and 18% of males had no plans to quit (see figure 3).

Figure 3: How Sure Students are that They Could Quit



Additional Data

The SSP also provides information on the following variables that are not reported in this summary.

- Attachment to school
- Preferred types of supports for quitting
- Awareness of *exposé* campaign

The School Smoking Profile questionnaire contains additional questions such as "number of cigarettes smoked per day." These data are not part of the usual SSP report, nevertheless it will be helpful in evaluating the impact of the program.

Summary

Implementation of the School Smoking Profile survey, as part of the evaluation of this pilot project, will allow measurement of key indicators over time. It is expected that both the survey administration process and the information provided in the SSP will have significant impact on both the intervention and ongoing project development. It will provide school administrators, students, teachers, public health staff, and other stakeholders with information on youth smoking rates, students' awareness of and attitudes toward smoking and suggestions for community action.

Phase two is now underway. It involves administering the survey in 12 high schools, which are new to the intervention this school year. Researchers from the University of Waterloo have developed several additional questions to assist Ottawa Public Health with the measurement of key indicators specific to counter-marketing strategies, such as student attitudes towards tobacco use.

The results provided in the individual School Smoking Profiles have been reviewed with interest by school administration and Public Health staff and have already proven to be useful in decision-making regarding program design.

ACKNOWLEDGEMENTS

This evaluation project is a collaborative effort between City of Ottawa Public Health, the University of Waterloo, Health Behavior Research Group, and the four Ottawa School Boards; the Ottawa-Carleton District School Board, the Ottawa-Carleton Catholic School Board, le Conseil des écoles publiques de l'Est de l'Ontario and le Conseil des écoles catholiques de langue française du Centre-Est. Funding for this project is provided through the Ottawa PHRED program, City of Ottawa Public Health and Health Canada.

SOURCES AND CONTACTS

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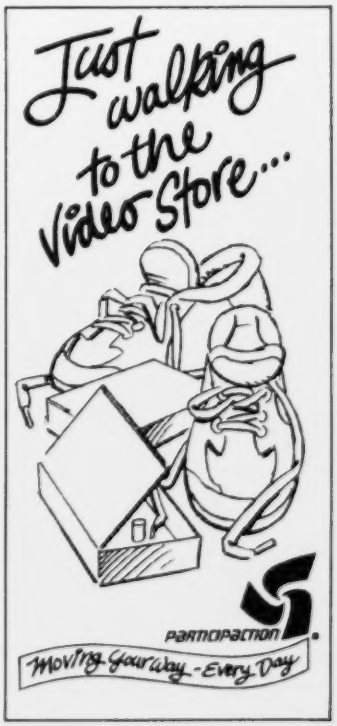
2. Roy Cameron et al. The Development of Community Level Data Collection Systems to Link Research and Practice: The Example of the School Smoking Profile. Draft concept paper – Nov 2003.



Summary of Reportable Diseases in Ontario - August, 2003

Health Units by Region	Population 2001	AIDS	Campylo.	Chicken-pox	Chlamydia	Enceph./ Meningitis	GAS	Gonorrhea
Algoma	117,200		1		14			2
North Bay	92,950	1	3	37	13			1
Northwestern	75,085		2	4	19			
Porcupine	84,755			1	9			
Sudbury	188,365		3	5	17			2
Thunder Bay	152,800		2		32	3		5
Timiskaming	35,335				5			
Total - Northern	**746,490**	**1**	**11**	**47**	**109**	**3**		**10**
Eastern Ontario	185,975		5		8			1
Hastings & Prince Edward	150,805		6		10	2		
Kingston, Frontenac & Lennox	178,065		1		27	3	1	1
Leeds, Grenville & Lanark	159,100		2					
Ottawa	774,070	1	42	21	86	7	1	23
Renfrew	96,465		5	1	4			
Total- Eastern	**1,544,480**	**1**	**61**	**22**	**135**	**12**	**2**	**25**
Durham	506,900		25	5	51	2		9
Haliburton-Kawartha	161,770		9		8			
Muskoka-Parry Sound	80,500		1	2	3			
Peel	988,950		38	32	132		2	38
Peterborough	125,860		14	1	11	2	1	
Simcoe	377,030		1		29	1		1
Toronto - total	2,481,495	4	144	53	532	6	3	147
North			*33*	*21*	*95*	*1*		*23*
South		*4*	*50*	*12*	*208*	*3*	*1*	*83*
East			*33*	*11*	*136*	*2*	*2*	*26*
West			*28*	*9*	*93*			*15*
York	728,980		68	5	53	4	2	6
Total - Central East	**5,451,485**	**4**	**300**	**98**	**819**	**15**	**8**	**201**
Grey Bruce	152,380		12	18	8	3		1
Elgin-St. Thomas	81,560		3		10	2		2
Huron	59,695		5		2	1		
Chatham-Kent	107,705				9			1
Lambton	124,295		1			1		
Middlesex-London	403,180		17		43			9
Oxford	99,265		8		10			2
Perth	73,680		4	1	6			
Windsor-Essex	374,985		15	4	39	3		2
Total - Southwest	**1,476,745**		**65**	**23**	**127**	**10**		**17**
Brant	118,085		4	4	18			3
Haldimand-Norfolk	104,580		7		8			2
Halton	375,230		19		28	3		3
Hamilton	490,270		18	12	67	1		12
Niagara	410,570		18	2	47	1		12
Waterloo	438,515		25		58	6		6
Wellington-Dufferin-Guelph	238,315		15	14	11		1	3
Total - Central West	**2,175,565**		**106**	**32**	**237**	**11**	**1**	**41**
August 2003	**11,394,765**	**6**	**543**	**222**	**1,427**	**51**	**11**	**294**
*** Total YTD 2003**	**-**	**63**	**2,573**	**10,213**	**11,892**	**260**	**301**	**2,102**
*** Total YTD 2002**	**-**	**78**	**3,069**	**11,827**	**11,947**	**467**	**264**	**1,964**

The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

** Infectious Syphilis cases include 'Primary, Secondary and Early Latent' staging effective January 1, 2003

* Adjusted for deletions and late reports.

Summary of Reportable Diseases in Ontario - August, 2003

Health Units by Region	Population 2001	Hepatitis A	Hepatitis B	Hepatitis C	Hib	Influenza	Measles	Meningo-coccal
Algoma	117,200			6				
North Bay	92,950		1	1				
Northwestern	75,085			1				
Porcupine	84,755							
Sudbury	188,365			3				
Thunder Bay	152,800		1	7				
Timiskaming	35,335							
Total - Northern	**746,490**		**2**	**18**				
Eastern Ontario	185,975			6				
Hastings & Prince Edward	150,805		1					
Kingston, Frontenac & Lennox	178,065			19				
Leeds, Grenville & Lanark	159,100			2				
Ottawa	774,070			17				
Renfrew	96,465			3				
Total- Eastern	**1,544,480**		**1**	**47**				
Durham	506,900							
Haliburton-Kawartha	161,770			11				
Muskoka-Parry Sound	80,500							
Peel	988,950		2	5				
Peterborough	125,860		1	9				
Simcoe	377,030			6				
Toronto - total	2,481,495	3	4	85	1	2		1
North			*3*	*19*		*1*		
South		*1*		*32*		*1*		
East		*2*		*17*				*1*
West			*1*	*17*	*1*			
York	728,980			9		1		1
Total - Central East	**5,451,485**	**3**	**7**	**125**	**1**	**3**		**2**
Grey Bruce	152,380			5		1		
Elgin-St. Thomas	81,560		1					
Huron	59,695							
Chatham-Kent	107,705							
Lambton	124,295							
Middlesex-London	403,180			14				
Oxford	99,265			3				
Perth	73,680			2				
Windsor-Essex	374,985			11				
Total - Southwest	**1,476,745**		**1**	**35**		**1**		
Brant	118,085	1		4				
Haldimand-Norfolk	104,580		1	2				
Halton	375,230			9				
Hamilton	490,270	5		15	1			
Niagara	410,570			23				
Waterloo	438,515			6				1
Wellington-Dufferin-Guelph	238,315			2				
Total - Central West	**2,175,565**	**6**	**1**	**61**	**1**			**1**
August 2003	**11,394,765**	**9**	**12**	**286**	**2**	**4**		**3**
*** Total YTD 2003**	**-**	**83**	**82**	**3,265**	**10**	**453**	**9**	**34**
*** Total YTD 2002**	**-**	**85**	**92**	**3,516**	**3**	**2,175**		**39**

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* Adjusted for deletions and late reports.

Summary of Reportable Diseases in Ontario - August, 2003

Health Units by Region	Population 2001	Mumps	Pertussis	Rubella	Salmon.	Shigellosis	Syphilis Infectious**	TB	VTEC
Algoma	117,200		2						
North Bay	92,950		1		4				
Northwestern	75,085				3				1
Porcupine	84,755								
Sudbury	188,365				3				
Thunder Bay	152,800		1		2				
Timiskaming	35,335				1				
Total - Northern	**746,490**		**4**		**13**				**1**
Eastern Ontario	185,975		2		3				1
Hastings & Prince Edward	150,805				5				
Kingston, Frontenac & Lennox	178,065		1		2			1	1
Leeds, Grenville & Lanark	159,100		1		3				
Ottawa	774,070		10		8	3	1		4
Renfrew	96,465				3				1
Total- Eastern	**1,544,480**		**14**		**24**	**3**	**1**	**1**	**7**
Durham	506,900		5		9	1			3
Haliburton-Kawartha	161,770				4				
Muskoka-Parry Sound	80,500				2				
Peel	988,950				30	4		3	3
Peterborough	125,860		2		2				1
Simcoe	377,030								
Toronto - total	2,481,495		2		90	5	26	29	13
North					*23*	*1*		*8*	*1*
South			*2*		*27*	*4*	*26*	*12*	*5*
East					*21*			*8*	*1*
West					*19*			*1*	*6*
York	728,980		2		30	1		2	5
Total - Central East	**5,451,485**		**11**		**167**	**11**	**26**	**34**	**25**
Grey Bruce	152,380				5				1
Elgin-St. Thomas	81,560								1
Huron	59,695				2				
Chatham-Kent	107,705				3	1			
Lambton	124,295								
Middlesex-London	403,180				6				1
Oxford	99,265				1				1
Perth	73,680				1				2
Windsor-Essex	374,985		1		5	1			1
Total - Southwest	**1,476,745**		**1**		**23**	**2**			**7**
Brant	118,085				4				
Haldimand-Norfolk	104,580								2
Halton	375,230		1		8			1	1
Hamilton	490,270				11	1		1	1
Niagara	410,570				11	2			1
Waterloo	438,515				14	3			1
Wellington-Dufferin-Guelph	238,315				3				3
Total - Central West	**2,175,565**		**1**		**51**	**6**		**2**	**9**
August 2003	**11,394,765**		**31**		**278**	**22**	**27**	**37**	**49**
*** Total YTD 2003**	**-**	**11**	**203**	**7**	**1,362**	**187**	**224**	**392**	**360**
*** Total YTD 2002**	**-**	**9**	**316**	**2**	**1,598**	**745**	**98**	**497**	**239**

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* Adjusted for deletions and late reports.